LISTING OF CLAIMS:

1. (Previously Amended) A semiconductor optical amplifier comprising:

a substrate;

a first gain section, disposed on said substrate;

a second gain section, disposed on said substrate and adjacent to said first gain section;

a residual cladding layer disposed above said first gain section and said second gain section,

wherein said residual cladding layer has a first thickness over said first gain section, and a second thickness over said second gain section, said first thickness being different than said second thickness,

wherein said first thickness of said residual cladding layer is selected to cause transverse electric (TE) light passing through said first gain section to experience a greater gain than transverse magnetic (TM) light passing through said first gain section; and

wherein said second thickness of said residual cladding layer is selected to cause said TM light passing through said second gain section to experience a greater gain than said TE light passing through said second gain section.

2. (Original) The semiconductor optical amplifier of claim 1, wherein said first and second gain sections are fabricated using one of quantum well materials and bulk materials.

3. (Original) The semiconductor optical amplifier of claim 1, wherein said first and second gain sections receive substantially the same drive current and have substantially the same length.

4. (Cancelled)

5. (Previously Amended) The semiconductor optical amplifier of claim 1, wherein said first thickness is less than said second thickness.

6. (Original) The semiconductor optical amplifier of claim 5, wherein said first thickness is 0.3 micrometers or more and said second thickness is 0.4 micrometers or less.

7. (Previously Amended) The semiconductor amplifier of claim 1, wherein a boundary between said first gain section and said second gain section is positioned to reduce reflections at the interface.

8. (Original) The semiconductor amplifier of claim 1, wherein the first gain section and the second gain section are connected by a passive waveguide.

9. (Original) The semiconductor amplifier of claim 8, wherein a mode transformation from active waveguides in the first and second gain sections to a passive waveguide connecting the first and second gain section employs a resonantly coupled set of active and passive waveguides.

10. (Previously Amended) The semiconductor optical amplifier of claim 1, wherein an overall gain of said semiconductor optical amplifier is substantially polarization independent.

11. (Cancelled)

12. (Previously Amended) A semiconductor optical amplifier comprising:

substrate means for integrating elements of said semiconductor optical amplifier thereon;

first gain means, disposed on said substrate;

second gain means, disposed on said substrate and adjacent to said first gain means,

residual cladding means for disposal above said first gain means and said second gain means,

wherein said residual cladding means has a first thickness over said first gain means, and a second thickness over said second gain means, said first thickness being different than said second thickness,

wherein said first thickness of said residual cladding means is selected to cause transverse electric (TE) light passing through said first gain means to experience a greater gain than transverse magnetic (TM) light passing through said first gain section; and

wherein said second thickness of said residual cladding means is selected to cause said TM light passing through said second gains means to experience a greater gain than said TE light passing through said second gain section.

13. (Original) The semiconductor optical amplifier of claim 12, wherein said first and second gain means are fabricated using one of quantum well materials and bulk materials.

14. (Original) The semiconductor optical amplifier of claim 12, wherein said first and second gain means receive substantially the same drive current and have substantially the same length.

15. (Cancelled)

16. (Previously Amended) The semiconductor optical amplifier of claim 12, wherein said first thickness is less than said second thickness.

17. (Original) The semiconductor optical amplifier of claim 16, wherein said first thickness is 0.3 micrometers or less and said second thickness is 0.4 micrometers or more.

18. (Cancelled)

19. (Original) The semiconductor amplifier of claim 12, wherein the first gain section and the second gain section are connected by a passive waveguide.

20. (Original) The semiconductor amplifier of claim 19, wherein a mode transformation from active waveguides in the first and second gain sections to a passive waveguide connecting the first and second gain section employs a resonantly coupled set of active and passive waveguides.

21. (Previously Amended) The semiconductor optical amplifier of claim 12, wherein an overall gain of said semiconductor optical amplifier is substantially polarization independent.

22. (Cancelled)

23. (Previously Amended) A semiconductor optical amplifier comprising:

a substrate;

a gain section, provided on said substrate;

a residual cladding layer disposed above said gain section, wherein said residual cladding layer has a first thickness over a first portion of said gain section and a second thickness over a second portion of said gain section, said first thickness being different than said second thickness,

wherein said first thickness of said residual cladding layer is selected to cause transverse electric (TE) light passing through said first portion of said

gain section to experience a greater gain than transverse magnetic (TM) light passing through said first gain section; and

wherein said second thickness of said residual cladding layer is selected to cause said TM light passing through said second portion of said gain section to experience a greater gain than said TE light passing through said second portion of said gain section.

24. (Cancelled)

25. (Original) The semiconductor optical amplifier of claim 23, wherein said gain section is fabricated using one of quantum well materials and bulk materials.

26. (Original) The semiconductor optical amplifier of claim 23, wherein said first and second portions of said gain section receive substantially the same drive current and have substantially the same length.

27. (Original) The semiconductor optical amplifier of claim 23, wherein said first thickness is less than said second thickness.

28. (Original) The semiconductor optical amplifier of claim 27, wherein said first thickness is 0.3 micrometers or more and said second thickness is 0.4 micrometers or less.

29. (Previously Amended) The semiconductor amplifier of claim 23, wherein a boundary between said first portion of said gain section and said second portion of said gain section is positioned to reduce reflections at the interface.

30. (Original) The semiconductor amplifier of claim 23, wherein the first portion of said gain section and the second portion of said gain section are connected by a passive waveguide.

31. (Original) The semiconductor amplifier of claim 30, wherein a mode transformation from active waveguides in the first and second portions of said gain section to said passive waveguide connecting the first and second portions of said gain section employs a resonantly coupled set of active and passive waveguides.

32. (Previously Amended) The semiconductor optical amplifier of claim 23, wherein an overall gain of said semiconductor optical amplifier is substantially polarization independent.

33. (Cancelled)

34. (Previously Amended) A method for amplifying an optical signal comprising the steps of:

providing a substrate;

providing a first gain section disposed on said substrate;

providing a second gain section disposed on said substrate and adjacent to said first gain section;

providing a residual cladding layer disposed above said first gain section and said second gain section, wherein said residual cladding layer has a first thickness over said first gain section, and a second thickness over said second gain section, said first thickness being different than said second thickness,

selecting said first thickness of said of said residual cladding layer to cause transverse electric (TE) light passing through said first gain section to experience a greater gain than transverse magnetic (TM) light passing through said first gain section;

selecting said second thickness of said residual cladding layer to cause said TM light passing through said second gain section to experience a greater gain than said TE light passing through said second gain section;

amplifying said optical signal in said first portion of said gain section to generate an amplified optical signal having a transverse electric (TE) component which is greater than a transverse magnetic (TM) component; and

amplifying said amplified optical signal in said second portion of said gain section to generate a substantially polarization independent output optical signal.

35. (Original) The method of claim 34, further comprising the step of:

fabricating said gain section using one of quantum well materials and bulk materials.

36. (Original) The method of claim 34, further comprising the step of :

driving said first and second portions of said gain section with substantially the same drive current.